the author's meaning, and is due to an apparent failure on the part of Professor Fiske to realize that the question is not what must be in order that $d(dx)$ may be 0, but what is in order that $\frac{d}{dx}(dx)$ may be 0.

DEPARTMENTS.

SOLUTIONS OF PROBLEMS.

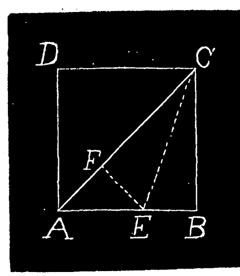
ARITHMETIC.

96. Proposed by RAYMOND SMITH, Tiffin, Ohio.

How many acres in a square field whose diagonal is 10 rods longer than the side ?

I. Solution by J. F. TRAVIS. Student at Ohio State University, Columbus, O.; EDWARD R. ROBBINS, Master of Mathematics, Lawrenceville School, Lawrenceville. N. J.; J. SCHEFFER, A. M., Hagerstown, Md.; F. R. HONEY, Ph. B., New Haven. Conn.; M. E. GRABER, Mt. Eaton; O.; WALTER HUGH DRANE, Professor of Mathematics, Jefferson College, Washington, Miss.; and JOSIAH H. DRUMMOND, LL. D., Portland, Me.

Let $ABCD$ be the square field, and AC its diagonal. On AC lay off CF equal to BC. At F erect FE perpendicular to AC and intersecting AB in E. Draw EC. Then in the right triangles CFE and CBE, CB equals CF, by construction and CE is common. Hence, FE equals EB. In the right triangle AFE, the angle FAE is equal to 45°. Hence, the angle FEA equals 45°. Hence the side AF equals the side FE. Then



$AB=(AE+EB)=[\sqrt{(AF^2+FE^2)}+EB]$

$=[\sqrt{(2EF^2)}+EB]=(EF\sqrt{2}+EB)=(\sqrt{2}+1)EB.$

But $EB=AF=10$ chains. $\therefore$ $AB=10(\sqrt{2}+1)$, and area of the field $=AB^2=100(\sqrt{2}+1)^2=100(3+2\sqrt{2})=582.8427$ square rods, or 3.642 acres.

II. Solution by M. A. GRUBER, A. M., War Department. Washington, D. C.; G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics, Chester High School, Chester, Pa.; and P. S. BERG, Superintendent of Schools, Larimore, N. D.

We will solve generally by making a=the excess of the diagonal over the side.

Let x=side of square field. Then $2x^2=(x+a)^2$.

Solving this equation for x, gives, $x=a(1\pm\sqrt{2})$.

$\therefore$ area$=x^2=a^2(3\pm2\sqrt{2})$.

Now substituting 10 for a, and we obtain

Area$=100(3\pm2\sqrt{2})=582.8427+$ square rods, or $17.157+$ square rods,

$=3.6429+$ acres, or $.10723+$ acres.

[QUERY. How interpret the second result? M. A. G.]

[NOTE.—The answer to this query is simply this: The second result is not geometrically interpretable, for the reason that the negative value of x from which it is derived, is not geometrically intrepretable. The negative value of x satisfies the algebraic condition expressed by the equation and that alone. ED. F.]

III. Solution by J. K. ELLWOOD, A. M., Principal of Colfax School, Pittsburg, Pa.; COOPER D. SCHMIDT, A. M., Professor of Mathematics, University of Tennessee, Knoxville, Tenn.; and CHARLES C. CROSS, Libertytown, Md.

The diagonal of a square=the side $\times\sqrt{2}$.

$\therefore$ side $\times\sqrt{2}$=side+10 rods, or side$(\sqrt{2}-1)=10$ rods, and side$=10\div(\sqrt{2}-1)$.

Hence $[10/(\sqrt{2}-1)]^2\div160=3.64+$, the number of acres.

97. Proposed by J. A. CALDERHEAD, M. Sc., Professor of Mathematics, Curry University, Pittsburg, Pa.

In what time will \$4000 amount to \$5134.96, interest at 6% payable annually?

Solution by WILLIAM W. CHAMPLAIN, Wickford, R. I.

The time is evidently between 4 and 5 years.

The interest on \$4000 for 4 years, at 6% is	\$960.00
The interest on \$240 for (3+2+1) years=6 years is	86.40
	\$1046.40

\$1134.96−\$1046.40=\$88.56, the interest on \$4000 for the number of months and days exceeding 4 years, plus the interest on four unpaid installments of annual interest for the same period; that is, on \$4000+\$960 or \$4960. Interest on \$4960 at 6% for one year is \$297.60; to gain \$88.56 it would require $\frac{8856}{29760}$ of a year, or 3 months, 17.13 days.

$\therefore$ \$4000 would amount to \$5134.96, at 6% annual interest in 4 years, 3 months, 17.13 days.

Also solved by *G. B. M. ZERR*, and *P. S. BERG*.

98. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

A poor man borrowed \$20 which he repaid in eleven monthly installments of \$2 each; what was the annual rate of interest (reckoned as simple interest)?

Solution by HON. JOSIAH H. DRUMMOND, LL. D., Portland, Me.

The last installment would be paid in eleven months, which, therefore, would be the time the \$20 would be on interest, and the interest would be $\frac{11}{12}\times 20\times$rate. The first installment would be on interest 10 months, and the interest on the installments would be $\frac{55}{12}\times2\times$rate. Then $\frac{220}{12}$ times the rate less $\frac{110}{12}$ times the rate would be \$2, or \$2 is $\frac{110}{12}$ times the rate. Hence the rate is $21\frac{9}{11}$.

Also solved by *WALTER H. DRANE*.

[NOTE. P. S. Berg solved problem 95, but his solution reached us too late for credit in last issue. Problem 99, should read, "How many cats will catch 100 rats in 100 minutes?" Ed. F.]